to dewy eve" they were incessantly upon the wing, exhibiting a dash and buoyancy of flight unknown to other birds. In the protection of their eggs and young they exhibited unmistakable promptness and valor, swiftly descending along graceful but vigorous curves to a perihelion point in uncomfortable proximity to the face and eyes of the intruding naturalist.

The birds of the Dakota period were doubtless even more active than the Terns of the present day. The probable presence of teeth in their jaws was an advantage evidently employed with disastrous effect not only to the fishes which constituted their food, but also to their rivals and enemies—the flying reptiles without teeth. The latter were overcome in the conflict, and teeth are no longer a necessity to birds.

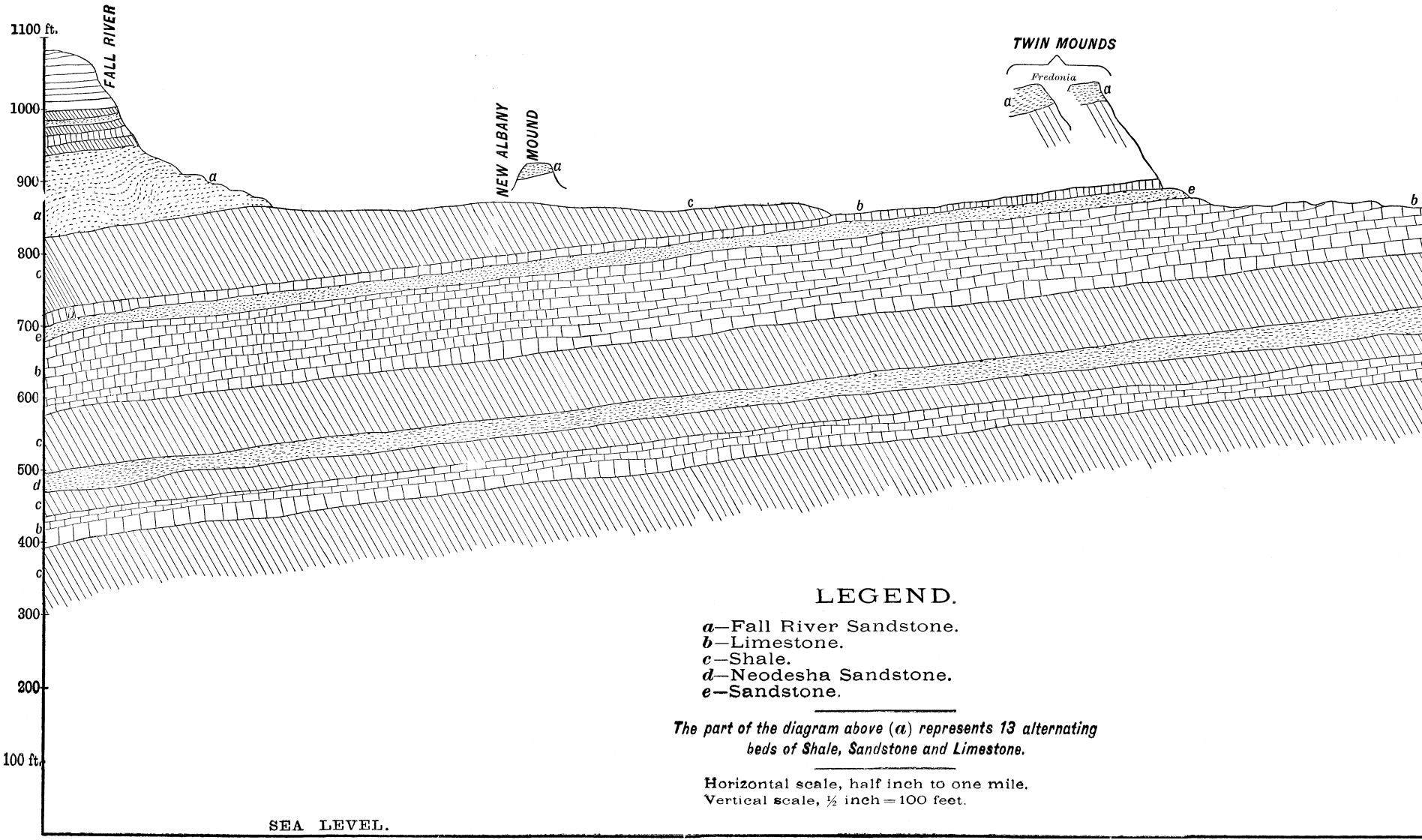
It is hoped that the discovery of our bird-track may stimulate search for other tracks, and that the evidence for the existence of birds in the Lower Cretaceous may not long depend upon a single "footprint upon the sands of [the Dakota] time."

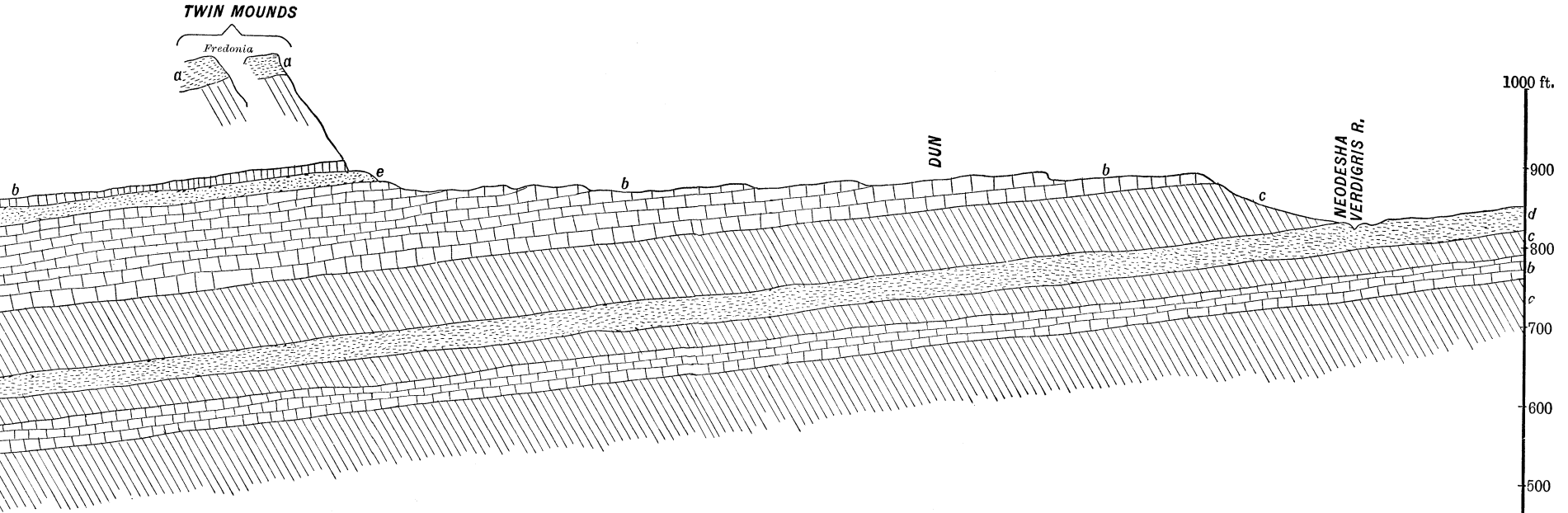
A GEOLOGICAL SECTION IN WILSON COUNTY, KANSAS.

BY ROBERT HAY, OF JUNCTION CITY, KANSAS.

In April, 1885, the writer was called upon to make some investigations for a coal company in the southeast corner of Greenwood county, and after so doing, spent some time east and south down the Fall river valley, nearly across Wilson county. Some observations were afterward made northwest, about Eureka, but as there was a break in the continuity of the explorations, the last are not noticed in this paper. The general result of the connected observations is the construction of a section parallel with the course of Fall river from the town of that name to a few miles east of Neodesha, in Wilson county. The thicknesses of strata in the western part were obtained by actual measurements both with tape-line and instruments of precision, and the others were carefully estimated from comparisons with the elevations of the San Francisco Railway, kindly supplied by Jas. Dun, Esq., the engineer of the company, and from the actual depth to which the strata have been penetrated by wells, as well as by measurements of precipitous bluffs. In one place a certain stratum was suspected to be merely a local intercalation, a substitute for part of another stratum; but as this could not be satisfactorily determined in the time at my disposal, the stratum was left in its place in the section till further investigation should support or throw out its claim to be considered as an addition to the general thickness of the formations. It does not, however, affect the result to a greater extent than two per cent.

The principal points which the writer would note in connection with this section are, (*a*) the evidence as to the average dip, and (*b*) the indications of disturbance of the strata. From Neodesha to Fall River, a distance of twenty-eight miles, the ascent of the Frisco railroad is 124 feet, but these stations are separated geologically by a vertical distance of 405 feet, the former place being situated about on the upper horizon of the Neodesha sandstone, and the latter in a similar position to the Fall River sandstone. This leaves the difference, 280 feet, to be accounted for by the westerly dip, which is therefore about ten feet to the mile. But this average dip, greater than is found in most parts of Kansas, is by no means uniform through the distance surveyed. A carefully measured mile at the western extremity of the section gave a dip of 45 feet, and in a quarry about two miles east of the town of Fall River the sandstone ledges were inclined to the horizon at an angle of more than ten degrees.


1100 ft.
1000
900
800
700
600
500
400
300
200
100 ft.
FALL RIVER
NEW ALBANY MOUND
TWIN MOUNDS
Fredonia
a
b
c
d
e
SEA LEVEL.
LEGEND.
a—Fall River Sandstone.
b—Limestone.
c—Shale.
d—Neodesha Sandstone.
e—Sandstone.
The part of the diagram above (a) represents 13 alternating beds of Shale, Sandstone and Limestone.
Horizontal scale, half inch to one mile.
Vertical scale, ½ inch = 100 feet.



EGEND.

Sandstone.

Sandstone.

above (a) represents 13 alternating
Sandstone and Limestone.

half inch to one mile.
inch = 100 feet.

SECTION DOWN

FALL RIVER VALLEY

—FROM—

Above the town of Fall River to below Neodesha.

—BY—

ROBERT HAY,

1885.

A. ZEESE & CO., ENGRS., CHI.

At this point (the quarry), the bluffs on the opposite side of the river are within half a mile apparently with a dip in a different if not opposite direction. In a valley beyond these bluffs is the outcrop of a ledge of limestone whose position is most easily explicable on the supposition that there is here a fault, an absolute dislocation of strata with considerable vertical displacement, but it will need further examination to verify this.

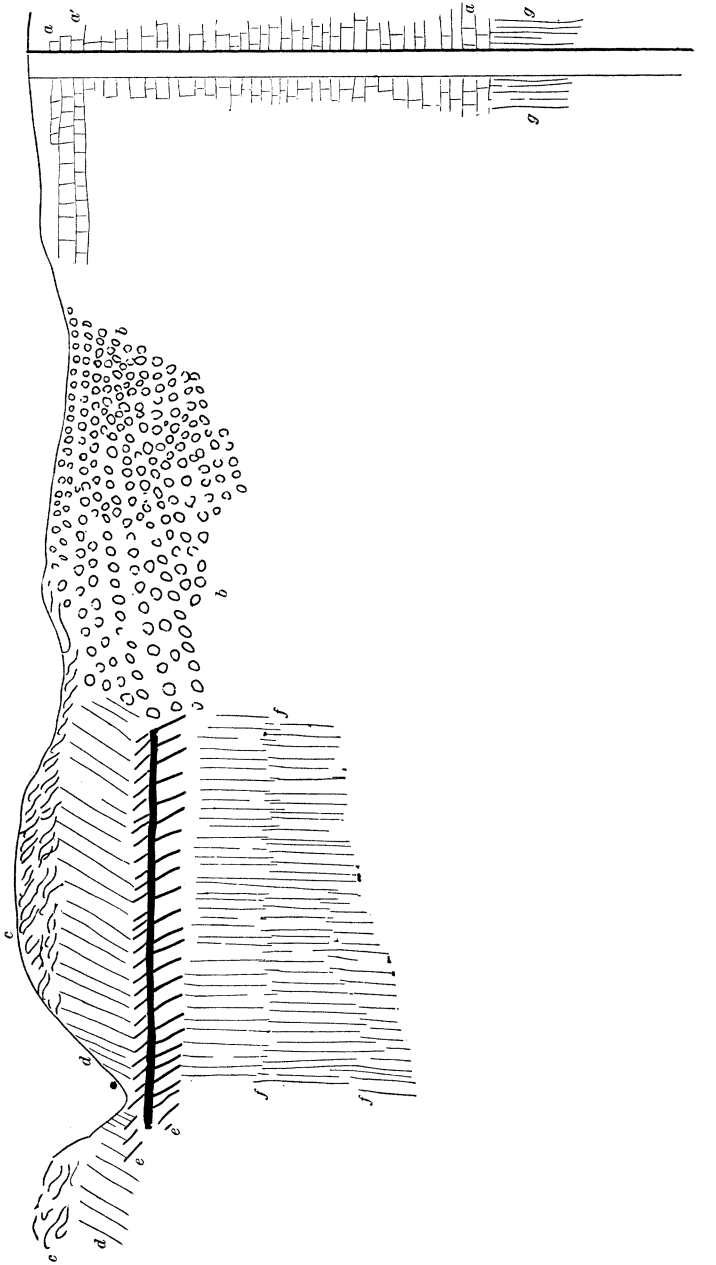
At Neodesha, near the mill, there is a fracture which gives a displacement which cannot be less than thirty vertical feet; how much more, remains to be proved. Its direction also will have to be determined by future exploration. There is very little dip to be seen on either side of the fault in the exposure examined, but it may be that that is owing to local direction of the strike. The diagram on the following page illustrates this fault.

In the neighborhood of the mound near New Albany there are also indications of displaced strata, and there is a well in the district from which has escaped a considerable amount of gas, which would be expected in a faulted region of the coal measures.

The massive sandstone of Fall River, eighty-five feet thick, produces now much valuable building-stone, and may be expected to yield still more with further examination of the large area of its outcrop. This is also true of the Neodesha sandstone, which, near the fault described above, has some of its mass as hard as and of the texture of quartzite. Salt (brine) also is found in connection with the former layer. The identification of these strata across the divides into the valleys of the Verdigris and Neosho would be of practical value, as they appear to be persistently definite horizons for considerable distances. The immense bed we have called the Dun limestone is probably the same as the thick Humboldt limestone of the Neosho valley. It has the same irregularity of structure and apparently the same fossils. In one district southeast of Fredonia it yields the finest crinoids hitherto obtained in the coal measures of Kansas.

The writer cannot forbear expressing the wish that the Academy should undertake the work of making a section of the valley of the Fall river, as it appears to be the steepest and deepest in the State, Neodesha being nearly one hundred feet lower than Oswego in the valley of the Neosho; and the headwaters on the confines of Butler and Greenwood counties come from an elevation of about 1,600 feet, where the Flint Hills culminate.

In closing this paper we will call attention to the sections which accompany it, and here record our sense of personal obligation to Mr. Edwin Walters, of Greenwood county, whose careful surveys with instruments of precision formed the starting-point of the writer's observations; also, for valuable aid, to the Hon. C. J. Butin, of Fredonia.



a, Neodesha Sandstone. *b*, Alluvium and Gravel. *c*, the Yellow Marl.
d, Limestone. *e*, Shale with Coal Seam. *f*, Blue Shale. *g*, Shale.